10. A process for producing ethyl acetate comprising:

(a) contacting acetic acid and ethanol in a reaction zone in the presence of a catalyst;

(b) directing vapors formed in the reaction zone to a distillation means to form an azeotrope containing 10 wt.% or less of water;

(c) condensing the azeotrope to form an condensate;

(d) separating the condensate into an organic phase rich in ethyl acetate and an aqueous phase rich in water;

(e) directing at least a portion of the organic phase to a membrane separation unit to form a dried organic stream; and

(f) directing at least a portion of the dried organic stream to the distillation means.

11. The process according to claim 10 wherein at least a portion of the dried organic stream is directed to the reaction zone.

REMARKS

The present application is a continued prosecution application of U.S. Application Serial No. 09/470,360. Applicants submit new claims to more particularly define the present invention. In particular, the new claims more clearly define the present invention by emphasizing that the azeotrope formed by the distillation means in the process of the present invention contains 10 wt.% water or less which is then condensed and separated. Support for this feature is found in Table A. Additional support for the new claims is found at page 6, line 21 through line 15 of page 7. No new matter has been introduced with the new claims.

Interview

The undersigned appreciates the courtesies extended to Applicants' attorney Dean Simmons (Registration No. 30,976) during the telephone interview of February 5, 2002. The final rejection of August 27, 2001 was discussed in the interview. Specifically, differences in the water content of the azeotropes formed in the first distillation means of the present invention and the azeotropes formed in the first distillation column of the Papa, et al. reference were discussed. Submission of claims highlighting these differences was discussed in the interview. Examiner Oh stated that he could not fully consider such claims if submitted in the parent filing because such consideration may involve additional searching and consideration of new issues. Mr. Simmons agreed to file a continuation of

the parent filing for purposes of submitting new claims consistent with issues discussed in the interview. The present continuation application was filed to submit the current new claims.

The Prior Art

New claims 6-9 recite a process for the production of ethyl acetate in which an azeotrope, containing 10 wt.% or less of water, produced in a first distillation is condensed and separated into an organic phase and an aqueous phase. A portion of the organic phase is directed to the reaction zone to maintain appropriate component balances in the reaction zone.

Previous rejections in the parent filing asserted that it would be obvious to modify the teachings of U.S. Patent 5,231,222 to Papa, et al. However, it would be impossible to modify Papa in this manner because of the large percentage of water content in the azeotrope produced in the first distillation of Papa. This high water content would prohibit separation of the first distillation stream and the return of the organic phase to the reactor, as currently claimed. The high water content of the first distillation Papa necessitates that the organic phase undergoes a second distillation before a stream is returned to the reaction zone, contrary to the claimed process.

At column 6, lines 61-68, Papa teaches that the azeotrope produced in the first distillation has a high water content, about 25-30 %. As such, it is necessary that the stream from the first distillation undergo a second distillation before a portion of the stream may be returned to the reaction zone. This necessity is demonstrated by the process arrangement seen in the Figure of Papa in which the stream from the first distillation **4** is directed to a second distillation **11** before a portion may be returned to the reactor. It would not be obvious to modify the design of Papa to bypass the second distillation because of the high water of the azeotrope formed in the first distillation **4**, which is described by Papa as having 25-30 % water content. To do so would destroy the "substantially anhydrous reaction medium, i.e. one containing no more than 5 wt. % water, in the reactor". *See*, column 6, lines 54-57 of Papa. Papa must distill the organic phase a second time to maintain the "anhydrous reaction medium" when a portion of the organic phase is directed to the reaction zone.

Accordingly, Papa teaches that it is necessary to use a second distillation before directing a portion of the organic phase to the reaction zone. Therefore, Papa teaches away from the present invention as set forth in claims 6-9.

Regarding new claims 10-11, these claims emphasize directing a portion of the organic phase from a first distillation to a membrane separation unit where water is removed from the organic phase before directing a portion of the organic phase to the reaction zone. In the parent filing prosecution, the corresponding claims were rejected as being obvious over the Papa Patent in view of U.S. Patent 5,248,427 to Spiske, et al. The rejections concluded it would be obvious to modify the process of Papa to include a membrane separation unit as taught by Spiske to remove additional water from an organic phase. However, Spiske teaches that an entire reaction product, and not just an organic phase, is to be processed through a membrane separation unit. To combine Spiske and Papa would result in the entire reaction mixture being routed through a membrane separation unit. There is no support in either reference to suggest that only the organic phase should be processed through a membrane separation unit. **Moreover, there is no suggestion to do so when the azeotrope from a first distillation of an ethyl acetate reaction product contains 10 wt % water or less.** As discussed above, the water content of Papa's first distillation azeotrope is more than double the claimed amount. It is important to look at the process as a whole. The specific organic steam selected by Applicants was not a choice one skilled in the art would have selected with no particular reason to select the stream. Papa and Spiske, taken alone or in combination, do not teach or suggest treating an organic stream with a membrane separation unit as claimed.

Conclusion

Consistent with the foregoing, Applicants' claims 6-11 are believed to be in condition for allowance. Consideration of these claims with an early Notice of Allowance is respectfully solicited. Should any issues remain unresolved, the Examiner is encouraged to telephone the undersigned at the number listed below so that all matters may be expeditiously resolved.

Respectfully Submitted,

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APPENDIX A
MARKED-UP VERSION OF CLAIMS

Please cancel claims 1-5.

6. (new) A process for producing ethyl acetate comprising:

(a) contacting acetic acid and ethanol in a reaction zone in the presence of a catalyst;

(b) directing vapors formed in the reaction zone to a distillation means to form an azeotrope containing 10 wt. % or less of water;

(c) condensing the azeotrope to form a condensate;

(d) separating the condensate into an organic phase rich in ethyl acetate and an aqueous phase rich in water; and

(e) directing at least a portion of the organic phase to the reaction zone.

7. (new) The process of claim 6 wherein at least a portion of the organic phase is directed to a membrane separation unit to form a dried organic stream.

8. (new) The process of claim 7 wherein at least a portion of the dried organic stream is directed to the distillation means.

9. (new) The process of claim 8 wherein at least a portion of the dried organic stream is directed to the reaction zone.

10. (new) A process for producing ethyl acetate comprising:

(a) contacting acetic acid and ethanol in a reaction zone in the presence of a catalyst;

(b) directing vapors formed in the reaction zone to a distillation means to form an azeotrope containing 10 wt. % or less of water;

(c) condensing the azeotrope to form an condensate;

(d) separating the condensate into an organic phase rich in ethyl acetate and an aqueous phase rich in water;

(e) directing at least a portion of the organic phase to a membrane separation unit to form a dried organic stream; and

(f) directing at least a portion of the dried organic stream to the distillation means.

11. (new) The process according to claim 10 wherein at least a portion of the dried organic stream is directed to the reaction zone.